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## Buying and wasting sustainably: determinants of green behaviour in Cyprus and Sweden

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*Published in:*  
Procedia Economics and Finance

*DOI:*  
[10.1016/S2212-5671\(14\)00705-9](https://doi.org/10.1016/S2212-5671(14)00705-9)

First published: 01/01/2014

*Document Version*  
Publisher's PDF, also known as Version of record

[Link to publication](#)

*Citation for pulished version (APA):*  
Foukaras, A., & Toma, L. (2014). Buying and wasting sustainably: determinants of green behaviour in Cyprus and Sweden. *Procedia Economics and Finance*, 14, 220 - 229. [https://doi.org/10.1016/S2212-5671\(14\)00705-9](https://doi.org/10.1016/S2212-5671(14)00705-9)

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International Conference on Applied Economics (ICOAE) 2014

## Buying and wasting sustainably. Determinants of green behaviour in Cyprus and Sweden

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### Abstract

The paper examines the impact of determinants on purchasing of eco-labelled products and waste separation for recycling in Cyprus and Sweden. The analysis uses logistic regression and Eurobarometer survey data. Results show that policy measures could be targeted to dealing with situational factors (e.g., availability of recycling services) (more so in Cyprus than in Sweden); improving access to trusted information sources and better targeting information (especially on environmental impacts of specific behaviours) to different population groups, e.g., by income and gender (in both Cyprus and Sweden); and improving labelling for ecological products (more so in Cyprus than in Sweden).

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Selection and/or peer-review under responsibility of the Organizing Committee of ICOAE 2014

**Keywords:** buying eco-labelled products; waste separation for recycling; behavioural determinants; environmental policies in European Union countries; logistic regression.

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### 1. Introduction

According to Axelrod and Lehman (1993), pro-environmental behaviour can be defined as “[...] an action which helps to protect and (or) to preserve the environment” (p. 153). Positive environmental actions such as recycling or buying eco-labelled products can be considered types of pro-environmental behaviours. Scholars argue that different behaviour types might be influenced by different factors, hence it would be statistically accurate and psychologically meaningful to examine them separately (Stern 2000). Van Den Bergh (2008) stresses the need to analyse pro-environmental behaviours in an integrated framework including psychological, economic and socio-demographic factors.

Several factors that influence pro-environmental behaviours have been identified in the scientific literature. These factors are usually grouped into two broad categories: internal and external factors. The first group

includes attitudes, values, beliefs (Ajzen, 1988; Stern, Dietz and Kalof, 1993; Cleveland, Kalamas and Laroche, 2005), environmental concern (Fransson and Garling 1999) and knowledge (Kaiser and Fuhrer, 2003; Brécard et al., 2009), while the second group includes availability of environmental services (Guagnano, Stern and Dietz, 1995; Derksen and Gartrell, 1993), socio-demographics (Brécard et al., 2009; Abeliotis, Koniari and Sardianou, 2010; Diamantopoulos et al., 2003; Guerin, Crete and Mercier, 2001) and economic factors (Stern 2000).

This paper examines the impact some of the aforementioned determinants have on two specific pro-environmental behaviours, namely purchasing of eco-labelled products and waste separation for recycling in two European Union (EU) countries, Cyprus and Sweden.

## 2. Material and methods

### 2.1. Data

The Special Eurobarometer 75.2 dataset (European Commission 2011), namely the section “Attitudes of the European Citizens towards the Environment” was used for the analysis. In this analysis we have selected a subset of the database, which includes 502 observations for Cyprus and 1005 for Sweden for a selected number of variables, namely the two types of pro-environmental behaviour, buying eco-labelled products behaviour and waste separation for recycling, and their determinants (socio-demographic variables; information-related variables - access to and trust in information sources; knowledge - system knowledge, action-related knowledge; consequence-based emotions - worries; locus of control - perceived ability to play a role in protecting the environment; behavioural intentions - willingness to perform behaviour). The variables and descriptive statistics (mean and standard deviation) are presented in Table 1.

Table1. Descriptive statistics (mean and standard deviation) for the variables included in the models

Variable	Statement	Value & label	Variable type	Cyprus		Sweden	
				SD	Mean	SD	Mean
Socio-demographic variables							
Age	Age	1=15-24 ; 2=25-35 ; 3=35-44 ; 4=45- 54 ; 5=55-64 ; 6=65+	categorical	1.691	3.32	1.557	4.46
Gender	Gender	1 =male ; 2= female	dichotomous	0.500	1.51	0.500	1.51
Education	How old were you when you stopped full-time education?	0=no full-time education; 15 years old or younger ; 2 =16-19 years old; 3 =still studying ; 4 =20+ years old	categorical	1.037	2.33	1.158	3.04
Occupation	Current occupation	1 =self-employed; 2 = manager; 3 = other white collars; 4= manual workers ; 5=house person; 6=unemployed; 7= retired; 8= student	categorical	2.195	4.87	2.230	4.75
Community type	Community type	1 =rural area or village; 2=small or middle town; 3 =large town	categorical	0.801	2.03	-	-
Level in society	Level in society – self placement	from 1=the lowest level in the society to 10=the highest level in the society	ordinal	1.477	5.36	-	-

<i>Information-related variables (access to/perceived usefulness/trust in information sources)</i>								
Information sources (publications/brochures)	From the following list, which are your three main sources of information about the environment?	0= not mentioned; 1=publications/brochures/information materials	dichotomous	0.255	0.70	-	-	
Information sources (relatives/family/friends)	>>	0 =not mentioned; 1 = relatives/family/friends	dichotomous	0.403	0.20	-	-	
Information sources (newspapers)	>>	0=not mentioned; 1 = newspapers	dichotomous	-	-	0.467	0.68	
Eco-labels in products	Do you think that current labels on products allow you to identify those products that are genuinely environmentally friendly?	1=yes certainty; 2= yes to some extent; 3=no, not really; 4=no, not at all	ordinal	0.940	2.40	0.837	2.51	
Lack of information about environmental issues (impact of current transport modes)	From the following list, please tell me the five main issues about which you feel you lack information in particular.	0 =not mentioned; 1= impact of current transport modes	dichotomous	0.329	0.12	-	-	
Trust European Union	From the following list, who do you trust most when it comes to environmental issues?	0=not mentioned; 1= European Union	dichotomous	-	-	0.284	0.09	
Trust national government	>>	0=not mentioned; 1=national government	dichotomous	-	-	0.373	0.17	
Trust international organisations (e.g. UN)	>>	0=not mentioned; 1=international organization	dichotomous	0.370	0.16	-	-	
Trust internet and social media about environmental issues	>>	0 =not mentioned; 1 =the internet and social medias	dichotomous	0.368	0.16	0.312	0.11	
Trust political parties (Greens)	>>	0=not mentioned; 1= political parties standing for the environment	dichotomous	-	-	0.399	0.20	
Trust all media sources (newspapers, radio, television, Internet and social media)	>>	0 =not mentioned; 1= total media	dichotomous	0.499	0.47	-	-	
<i>Knowledge (system knowledge, action-related knowledge)</i>								
Information related to general environmental issues	In general, do you consider that you are very well, fairly well, fairly badly or very badly informed about environmental issues?	1 =very well informed; 2 =not well informed; 3 =well informed; 4 =very well informed	ordinal	-	-	0.582	2.07	
State of the environment influence the quality	In your opinion, to what extent do the following factors influence your	1=very much; 2= quite a lot; 3=not much; 4=not at all	ordinal	-	-	0.713	1.73	

of life	"quality of life"?						
Tackle environmental problems (by ensuring higher financial incentives)	In your opinion, which of the following would be the most effective way(s) of tackling environmental problems?	0=not mentioned; 1= ensuring higher financial incentives	dichotomous	-	-	0.499	0.47
Tackle environmental problems (by introducing stricter environmental legislation)	>>	0=not mentioned; 1= introducing stricter environmental legislation	dichotomous	4.69	0.33	-	-
Tackle environmental problems (by providing more information)	>>	0=not mentioned; 1= providing me more information on environmental issues	dichotomous	-	-	0.447	0.28
Priority :consider environment aspects when make large expenditures	In your opinion, which of these should be the top-three priorities for Cyprus/Sweden citizens in their daily life to protect the environment?	0=not mentioned; 1= consider environmental aspects when making large expenditures	dichotomous	0.384	0.18	0.399	0.20
Priority: purchase ecological products	>>	0=not mentioned; 1=purchase ecological products	dichotomous	-	-	0.456	0.29
Priority: sort waste	>>	0=not mentioned; 1=sort waste so that it can be recycled	dichotomous	0.469	0.68	0.495	0.58
<i>Consequence-based emotions (worries)</i>							
Worries about climate change	From the following list, please pick the five main environmental issues that you are worried about.	0=not mentioned; 1=climate change	dichotomous	-	-	0.500	0.51
Worries about consumption habits	>>	0=not mentioned; 1=our consumption habits	dichotomous	0.397	0.20	-	-
<i>Locus of control</i>							
Perceived ability to play a role in protecting the environment	As an individual, you can play a role in protecting the environment	1= totally agree; 2= tend to agree; 3= tend to disagree; 4= totally disagree	ordinal	0.745	1.61	0.600	1.39
<i>Behavioural intentions</i>							
Willingness to pay more for eco-labelled products	Please tell me whether you agree with the following statement: you are ready to buy environmentally friendly products even if they cost more.	1 =totally agree; 2 =tend to agree; 3 =tend to disagree; 4=totally disagree	ordinal	0.891	1.76	0.778	1.64
<i>Behaviour</i>							
Eco-labelled products purchasing	Have you done any of the following during the past	0=no; 1=yes	dichotomous	0.382	0.18	0.500	0.49

behaviour	month for environmental reasons?						
Waste separation for recycling behaviour	>>	0=no; 1=yes	dichotomous	0.495	0.58	0.400	0.80

The reason for the selection of these specific pro-environmental behaviours is that waste separation for recycling is the behaviour with the highest average percentage of participants (66 per cent), while buying eco-labelled products has the lowest percentage of participants (17 per cent) in the European Union (European Commission 2011). As regards to the selection of countries, there are several reasons that support our choice. At first, both countries are EU members and therefore they share the EU environmental legislation. Second, these countries show significant discrepancies regarding their environmental performance. Based on the Eurobarometer 75.2 findings (Eurobarometer 2011), Sweden has a higher percentage of participants in these two types of pro-environmental behaviours than Cyprus. Specifically, 78 per cent of the citizens in Sweden participate in waste separation for recycling behaviour and 50 per cent of them buy eco-labelled products. For Cyprus the corresponding percentages are 57 per cent and 18 per cent, respectively. In addition, the Environmental Performance Index 2012 ranked Sweden in the 9th place in environmental performance on a worldwide scale, while Cyprus is on the 44th place (Emerson et al. 2012). Third, there are many differences between the economies of the two countries and implicitly, Cyprus is affected by the economic crisis more strongly than Sweden. At last, the significant demographic and cultural differences between these two countries add an additional interest to this analysis.

## 2.2. Logistic regression

Logistic regression was used to analyse the impacts of several variables on the two types of behaviour, namely buying eco-labelled products and separation of waste for recycling. This particular type of regression is appropriate in models where the dependent variable is dichotomous. Logistic regression computes the probability (log-odds) that a case will belong to one of the two categories, given a set of predictor variables. The logistic regression model is presented in Equation 1:

$$P(Y) = \frac{1}{1 + e^{-(b_0 + b_1X_{1i} + b_2X_{2i} + \dots + b_nX_{ni})}} \quad (1)$$

where:  $P(Y)$  is the probability of  $Y$  occurring;  $e$  is the base of natural logarithms;  $b_0$  is a constant value;  $b_n$  is the regression coefficient of the corresponding predictor variable  $X_n$ . The coefficients of the predictor variables are estimated with the maximum-likelihood method.

## 3. Results

### 3.1. Determinants for eco-labelled products purchasing behaviour in Cyprus

This regression model has 479 observations (23 observations were excluded due to missing values). The overall fit of the model was good and explained about a third of the variance in behaviour (Nagelkerke  $R^2$  equal to 29 per cent). No multicollinearity issues were encountered. Table 2 presents the variables included in the model and regression results.

Table 2. Results of the model ‘Eco-labelled products purchasing behaviour in Cyprus’

	B	S.E.	Wald	df	Sig.	Exp(B)	VIF
Gender	0.519	0.28	3.434	1	0.064	1.68	1.054
Occupation	-0.189	0.063	9.056	1	0.003	0.828	1.053
Information sources (publications/ brochures)	0.905	0.423	4.576	1	0.032	2.471	1.017
Eco-labelling in products	-0.771	0.162	22.57	1	0	0.463	1.021
Trust internet and social media about environmental issues	0.821	0.316	6.727	1	0.009	2.273	1.019
Tackle environmental problems by introducing stricter environmental legislation	0.752	0.272	7.622	1	0.006	2.121	1.033
Priority: consider environmental aspects in large expenditures	0.541	0.321	2.836	1	0.092	1.717	1.032
Willingness to pay more for eco-labelled products	-0.887	0.226	15.365	1	0	0.412	1.056

All variables significantly influence Cypriot citizens’ behaviour with the exception of gender and awareness that considering environmental aspects when making large expenditures should be a main priority for Swedish citizens in their daily life to protect the environment. The most important determinant is perceived usefulness of information provided by eco-labels (Brécard et al. 2009), followed by willingness to pay more for eco-labelled products; occupation; awareness that introducing stricter environmental legislation would be one of the most effective way(s) of tackling environmental problems (Kaiser and Fuhrer 2003); trust in internet and social media about environmental issues; and perceptions of publications/ brochures as a main source of information about the environment. This may suggest that people who use eco-labels to identify those products that are genuinely environmentally friendly, who are willing to buy environmentally friendly products even if they cost more, who have higher income, are more aware of the regulatory impact on environment and are more informed are more likely to purchase eco-labelled products for environmental reasons.

### 3.2. Determinants for eco-labelled products purchasing behaviour in Sweden

This regression model has 967 observations (30 observations were excluded due to missing values). The overall fit of the model was good and explained a third of the variance in behaviour (Nagelkerke  $R^2$  equal to 33 per cent). No multicollinearity issues were encountered. Table 3 presents the variables included in the model and regression results.

Table 3. Results of the model ‘Eco-labelled products purchasing behaviour in Sweden’

	B	S.E.	Wald	df	Sig.	Exp(B)	VIF
Gender	0.794	0.16	26.430	1	0	2.213	1.07
Education	0.14	0.07	3.955	1	0.05	1.151	1.18
Occupation	-0.09	0.04	6.578	1	0.01	0.913	1.14
Eco-labelling in products	-0.19	0.09	4.335	1	0.04	0.827	1.04
Trust political parties (Greens)	0.354	0.19	3.539	1	0.06	1.424	1.02
Information related to general environmental issues	-0.27	0.13	4.058	1	0.04	0.766	1.06

Priority: purchase ecological products	1.036	0.17	38.000	1	0	2.818	1.05
Priority: consider environmental aspects in large expenditures	0.484	0.19	6.661	1	0.01	1.622	1.02
Worries about climate change	0.385	0.15	6.531	1	0.01	1.47	1.03
Perceived ability to play a role in protecting the environment	-0.52	0.14	13.920	1	0	0.593	1.1
Willingness to pay more for eco-labelled products	-0.94	0.12	59.640	1	0	0.39	1.17

With the exception of trust in political parties (Greens), which is a marginally significant variable, all variables significantly influence the eco-labelled products purchasing behaviour of the Swedish citizens. The most significant determinant for this particular type of behaviour of the Swedish citizens is the willingness to pay more for eco-labelled products, followed by awareness that purchasing ecological products should be a main priority for Swedish citizens in their daily life to protect the environment; gender (Brécard et al. 2009); perceived ability to play a role in protecting the environment (Shrum, Lowrey and McCart, 1994); awareness that considering environmental aspects when making large expenditures should be a main priority for Swedish citizens in their daily life to protect the environment; occupation; climate change as a main environmental issue that people are worried about (Böhm and Pfister 2000); perceived usefulness of information provided by eco-labels; perceived level of information about environmental issues; and education (Abeliotis, Konari and Sardanou, 2010).

### 3.3. Determinants of waste separation for recycling behaviour in Cyprus

This regression model has 469 observations (33 observations were excluded due to missing values). The overall fit of the model was good and explained a quarter of the variance in behaviour (Nagelkerke R<sup>2</sup> equal to 26 per cent). No multicollinearity issues were encountered. Table 4 presents the variables included in the model and regression results.

Table 4. Results of the model ‘Waste separation for recycling behaviour in Cyprus’

	B	S.E.	Wald	df	Sig.	Exp(B)	VIF
Age	0.205	0.06	10.39	1	0	1.228	1.37
Gender	0.536	0.21	6.308	1	0.01	1.71	1.04
Education	0.203	0.12	2.683	1	0.1	1.225	1.4
Community type	0.693	0.14	26.07	1	0	2	1.07
Level in society	0.215	0.07	8.811	1	0	1.239	1.06
Information sources (relatives/ family/ friends)	-0.68	0.26	6.621	1	0.01	0.508	1.03
Lack of information about environmental issues (transport modes)	-0.64	0.32	3.969	1	0.05	0.53	1.03
Trust international organisations ( e.g., UN)	0.612	0.3	4.128	1	0.04	1.844	1.07
Trust all media sources	0.656	0.22	9.063	1	0	1.928	1.06
Priority: sort waste	0.527	0.23	5.267	1	0.02	1.693	1.06
Worries about consumer habits	0.688	0.28	6.045	1	0.01	1.989	1.05
Perceived ability to play a role in protecting the	-0.45	0.14	9.652	1	0	0.641	1.08



environment

With the exception of education, all variables were found to be significant determinants of behaviour. The most important determinant is community type (Torgler and García-Valiñas 2007), followed by age (Abeliotis, Koniari and Sardianou, 2010); perceived ability to play a role in protecting the environment (Shrum, Lowrey and McCart, 1994); trust in media sources (newspapers, radio, television, internet and social media) about environmental issues (Vicente and Reis, 2008); perceived level in society (Gamba and Oskamp, 1994); perceptions of relatives/family/friends as a main source of information about the environment; gender; consumer habits as a main environmental issue that people are worried about (Böhm 2003); awareness that sorting waste should be a main priority for Cypriot citizens in their daily life to protect the environment; trust in international organisations about environmental issues; and perceived lack of information about the environmental impact of transport.

### 3.4. Determinants of waste separation for recycling in Sweden

This regression model has 980 observations (25 observations were excluded due to missing values). The overall fit of the model was good and explained a fifth of the variance in behaviour (Nagelkerke  $R^2$  equal to 20 per cent). No multicollinearity issues were encountered. Table 5 presents the variables included in the model and regression results.

Table 5. Results of the model ‘Waste separation for recycling behaviour in Sweden’

	B	S.E.	Wald	df	Sig.	Exp(B)	VIF
Age	0.079	0.057	1.94	1	0.164	1.082	1.092
Gender	0.335	0.176	3.627	1	0.057	1.398	1.036
Information sources (newspapers)	0.336	0.181	3.456	1	0.063	1.4	1.059
Trust national government	0.611	0.276	4.882	1	0.027	1.842	1.16
Trust European Union	-0.968	0.305	10.084	1	0.001	0.38	1.159
Trust internet and social media about environmental issues	-0.761	0.248	9.429	1	0.002	0.467	1.024
Information related to general environmental issues	-0.509	0.146	12.133	1	0	0.601	1.042
State of the environment influence the quality of life	-0.415	0.122	11.547	1	0.001	0.66	1.072
Tackle environmental problems (by ensuring financial incentives)	0.353	0.181	3.792	1	0.052	1.424	1.105
Tackle environmental problems (by providing more information)	0.359	0.211	2.891	1	0.089	1.431	1.101
Priority: purchase ecological products	0.356	0.197	3.244	1	0.072	1.427	1.053
Priority: sort waste	1.335	0.186	51.573	1	0.000	3.799	1.122
Priority: consider environmental aspects in large expenditures	0.67	0.232	8.32	1	0.004	1.954	1.08
Perceived ability to play a role in protecting the environment	-0.421	0.133	10.1	1	0.001	0.656	1.074

The strongest determinant of behaviour is awareness that sorting waste should be a main priority for Swedish citizens in their daily life to protect the environment, followed by perceived level of information

about environmental issues; perceptions about the state of the environment influence on the quality of life; perceived ability to play a role in protecting the environment; trust in European Union, internet and social media and, respectively, national government about environmental issues; awareness that considering environmental aspects in large expenditures should be a main priority for Swedish citizens in their daily life to protect the environment; awareness that ensuring financial incentives would be one of the most effective way(s) of tackling environmental problems; and gender. This implies that people more likely to sort waste for recycling consider sorting waste to be a top priority for environmental protection; have stronger perceptions about the environmental influence on their quality of life and about own ability to play a role in protecting the environment; feel more informed about the environment and have stronger trust in environmental information sources (national government rather than the EU or internet/social media); have better knowledge about ways to protect the environment; and are women (rather than men). As detailed in the previous models, the results confirm findings from the literature. Additionally, previous studies showed that trust in government and other institutions can motivate an individual to accept his/her environmental responsibilities and therefore to adopt a pro-environmental behaviour (Harrison, Burgess and Filius, 1996).

#### **4. Discussion and conclusions**

The analysis has the limitations inherent to many studies which use similar datasets. Namely, as the survey was self-report, there is always the possibility of social desirability bias. Some attitudinal variables were measured by single item-questions, which, as Ajzen (1988) pointed out, may lead to issues of reliability. However, several other studies used single item questions to measure attitudes (Torgler and García-Valiñas 2007). In addition, the survey did not include questions about the frequency of the environmental actions but only referred to the actions that citizens performed during the month previous to the interview. This might imply some regularity of behaviour, however the findings should be treated with caution. Despite these limitations, the analysis provides interesting findings regarding buying eco-labelled products and separating waste for recycling in Cyprus and Sweden.

Overall, buying eco-labelled products and recycling in both countries is affected by different combinations of factors, which depict the need for different policy measures to enhance pro-environmental behaviour of citizens in each of the two countries. Namely, policy measures could be targeted to dealing with situational factors such as availability of recycling services and the corresponding changes in the legislative and institutional framework (more so in Cyprus than in Sweden); improving access to trusted sources of information and better targeting the information (especially related to the environmental impacts of specific behaviours) to different population groups, e.g., by income and gender (in both Cyprus and Sweden); and improving labelling for environmental friendly products (more so in Cyprus than in Sweden). We believe that these differences are related to the different economic, institutional, organisational and cultural situation of each country. The fact that Cyprus was environmentally inactive for several years while Sweden was one of the earliest environmentally active countries is of major importance. Environmental policies, legislation and campaigns to raise awareness in Cyprus have started much later than in Sweden. For instance, the first environmental legislative measures (air and water pollution control) in Cyprus were implemented in 1992 (CDE, 2012), while the Environmental Protection Agency and the National Licensing Board for Environment Protection have been established in Sweden in 1967 (Lönnroth 2010). The situation is improving as, after Cyprus has joined the EU in 2004, more than 250 environmental laws and regulations have been adopted in the Cypriot parliament (CDE, 2012). However, significant differences remain when comparing the state of the environment in the two countries and, as this analysis pointed out, different policy measures are required to deal with these differences when it comes to enhancing the pro-environmental behaviour of the population.

## Acknowledgements

The data used in this study was provided by GESIS. SRUC receives grant funding from the Scottish Government.

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